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WATER HARVESTING AND AQUACULTURE  
FOR RURAL DEVELOPMENT

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SINGLE POND SYSTEM FOR SUSTAINABLE PRODUCTION  
OF *OREOCHROMIS NILOTICUS*

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INTERNATIONAL CENTER FOR AQUACULTURE  
AND AQUATIC ENVIRONMENTS  
AUBURN UNIVERSITY

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## INTRODUCTION

Farmers can grow mixed-sex tilapia for food and still produce their own fingerlings in a single pond (Figure 1). The system requires few inputs and works well on subsistence farms. Farmers using this system may no longer need to depend on government or private hatcheries for fingerlings.

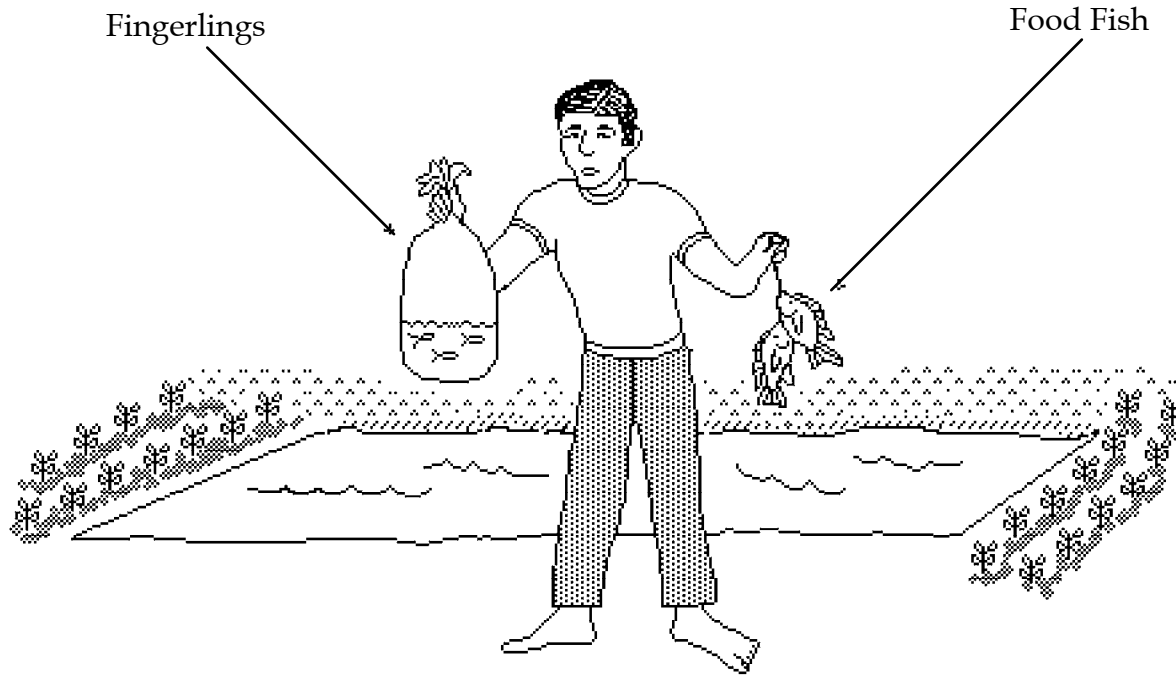


Figure 1: One pond can produce food fish and fingerlings.

## PROCEDURE FOR POND MANAGEMENT

1) Stock mixed-sex, same-age tilapia fingerlings of 1 to 3 g (2 to 4 cm) at a rate of 1 fish per m<sup>2</sup> in a prepared grow-out pond. Do not stock fingerlings larger than 5 g as they will quickly reproduce and the offspring will cause overcrowding and stunting of the stocked fish. For information on the production of 1 g, same-age tilapia fingerlings refer to the manual "Production of 1-Gram, Mixed-Sex *Oreochromis Niloticus* Fingerlings in Earthen Ponds," in this series.

2) Culture the fish 4 to 6 months using feeding and fertilization practices. Manuals describing these practices are available in this technical series. Fingerlings will mature and reproduce in 2 to 5 months. Reproduction may occur within 2 months in warm climates when larger fingerlings (5 g) have been stocked; cooler climates and smaller fingerlings may delay reproduction for up to 5 months.

3) When the pond is harvested, small fingerlings of 1 to 3 g size should be separated from larger fish. They may be collected with nets and temporarily held in various facilities (Table 1) while the grow-out pond is prepared for restocking. Holding facilities should not be stocked with more than 100 fish per m<sup>2</sup>. It is important that fingerling numbers be estimated accurately to avoid disease and overcrowding problems. Temporary holding areas, containers or net enclosures should be prepared at least 24 hours prior to harvesting the grow-out pond. Figure 2 illustrates several methods for holding harvested fish when only the grow-out pond is available.

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Table 1: Temporary holding facilities for tilapia fry and fingerlings.

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<u>Holding Facility</u>	<u>Recommended holding time</u>
1. Small containers such as pails, jars, cans, etc.	
a) No water exchange	- several minutes
b) Periodic water exchange	- several hours
c) Continuous water exchange	- indefinite
2. Floating woven baskets <sup>a</sup>	- 48 hours to indefinite
3. Net Enclosures <sup>b</sup>	- 1 week to indefinite
4. Small pools, holes in the ground or ponds	- 3 weeks to indefinite

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a) Baskets may be anchored or secured to poles or other objects while suspended in a pond or some other water body to allow continuous water exchange.

b) Net enclosures are secured to poles or other objects and allow continuous water exchange.

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4) The harvested grow-out pond should be dried until the bottom mud cracks. If drying is not possible, fish toxicants should be used to kill all fish remaining in the pond. These undesirable fish may mature and reproduce and/or will compete with the restocked fingerlings for food. Hydrated lime is inexpensive and can be used to kill fish in a pond that can not be dried. Furthermore, hydrated lime will kill aquatic fish predators and fish disease organisms. It will also correct acid pond soil and water. Fine mesh screens are placed over the water inlet to prevent wild fish from entering the pond during refilling. Publications describing fish toxicants and liming are available in this technical series.

5) Ideally, the grow-out pond is restocked 7 days after filling and initial fertilization. However, if fingerling holding facilities are precarious and fingerlings are in danger of dying, the grow-out pond can be stocked the same day as filling and fertilization. Fingerlings are stocked into the grow-out pond at a rate of 1 per m<sup>2</sup>.

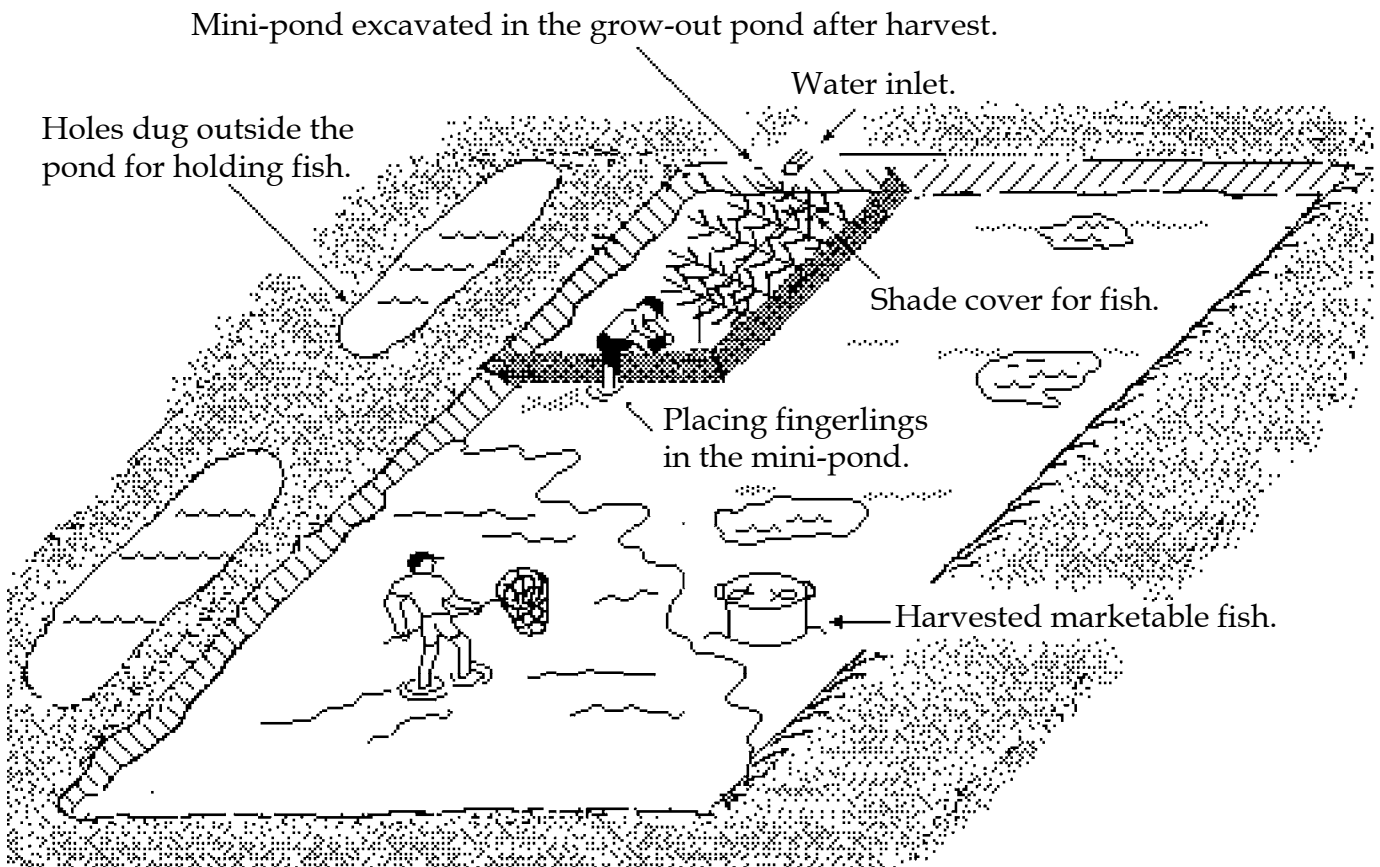


Figure 2: Temporary holding facilities for fingerlings.

## HOW TO BUILD A HOLDING COMPARTMENT WITHIN THE GROW-OUT POND

- 1) The grow-out pond can be drained until the bottom is exposed.
- 2) Mud from the grow-out pond bottom is piled-up to build dikes about 25 cm high to form temporary holding compartments inside the pond. The holding compartment should be located next to the water inlet.
- 3) Up to 50 fingerlings per m<sup>2</sup> are stocked into the compartments. A 100 m<sup>2</sup> pond would require a 2 m<sup>2</sup> compartment to hold enough fingerlings for restocking. Water depth of 10 to 20 cm should be maintained. Cut branches may be stuck diagonally into the bottom mud around the edges to provide afternoon shade. If fish-eating birds are a problem, several banana leaves may be floated on the water surface to provide shelter. Fingerlings should not be held longer than 3 weeks, and should be fed if held longer than 1 week. Fresh water should be added to the holding compartment to prevent low oxygen problems and replace water lost to evaporation and seepage.
- 4) The fingerlings can be stocked by breaking the holding compartment dike and allowing them to swim into the filled and prepared grow-out pond. This procedure avoids unnecessary handling and reduces the chances for injury, but an accurate estimate of the number of fingerlings present in the holding facility is needed to avoid overstocking the grow-out pond. Since some fingerlings are bound to die from the stress of harvesting, an assumed 5 to 10% mortality rate in the holding facility is expected. Thus, if 500 fingerlings are required for restocking purposes, a total of 525 to 550 fingerlings should be placed into the holding facility.

## ADVANTAGES OF THE SINGLE GROW-OUT POND SYSTEM

- 1) Farmers with small ponds can become self-sufficient fingerling producers.
- 2) Only one pond is needed to produce food fish and fingerlings. About 1000 to 3000 fingerlings can be produced in a 100 m<sup>2</sup> pond over a 4 to 6 month period.
- 3) The single grow-out pond system uses simple technology that can be learned by farmers unknowledgeable in fish culture.

## DISADVANTAGES OF THE SINGLE GROW-OUT POND SYSTEM

- 1) Harvested food fish are small because of competition for food by the fingerlings.
- 2) Special holding facilities are needed while the grow-out pond is being prepared for the next fingerling production cycle.

## GLOSSARY OF TERMS

fertilizer - a substance added to water to increase the production of natural food organisms.

fingerling - a fish ranging in weight from 1 to 25 g or greater than 2.5 cm in total length.

fish toxicant - a substance used to kill undesirable fish in ponds prior to stocking fingerlings.

food fish - fish cultured and marketed for human consumption.

fry - recently hatched fish weighing less than 1 g or measuring less than 2.5 cm in total length.

grow-out pond/facility - a pond or other facility used to grow aquatic animals to marketable size.

holding pond/facility - a pond or other facility used for the temporary holding of aquatic animals.

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Alex Bocek, Editor  
International Center for Aquaculture and Aquatic Environments  
Swingle Hall  
Auburn University, Alabama USA 36849-5419

Suzanne Gray, Illustrator

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